

I claim:

- 5 1. A method made up of a repetitive series of steps for coating the outer surface of a length of coiled pipe with insulating material made up of an epoxy component mixture and a curing agent component mixture, and wherein the method comprises:
- a) unrolling the pipe from a pipe reel;
 - b) heating the pipe with an induction heat coil member;
 - c) straightening the pipe with a series of laser controlled hydraulic cylinders that press the pipe against anvils above and below the pipe;
 - d) advancing the straightened pipe with mechanized rollers adjacent to the pipe;
 - e) further heating the pipe to a desired temperature;
 - f) moving the heated pipe into a heated retort;
 - 5 e) filling the retort with the epoxy component mixture and the curing agent component mixture; and
 - g) releasing the insulation covered pipe from the retort.
- 20 2. The method as recited in claim 1, wherein said step of filling the retort includes mixing said epoxy component mixture with said curing agent mixture and pumping said mixture into said heated retort.

3. The method as recited in claim 1, wherein said retort has endcaps on both sides where the pipe enters and exits said retort.

4. The method as recited in claims 2 or 3, wherein said retort is made up of bottom hinged halves that open lengthwise by the controlled hydraulic cylinders to receive the pipe and in the closed configuration have topside openings through which liquid insulating material is introduced to the retort and surrounds the pipe.

5. The method as recited in claim 1, wherein said insulating material is mixed in an area apart from the retort.

6. An insulating material initially prepared as separate mixtures then combined at a ratio of 1 to 1 by volume for coating a tubular member, comprising:

- a) an epoxy component mixture comprising an epoxy compound, acrylic resins and ceramic particles; and
- b) a curing component mixture comprising curing agents, and ceramic particles.

7. The insulating material as recited in claim 6, wherein said epoxy component mixture contains:

- a) an Epon 8132 comprising a diglycidal ether of bis-phenol-A mixed with a monofunctional epoxide of a C12-C13 aliphatic alcohol;
- b) an Epon 8161 comprising is a diglycidal ether of a bis-phenol-A mixed with acrylate

monomers;

- c) a Heloxy 9 comprising is a monofunctional epoxide of a C12-C13 aliphatic alcohol;
- d) a Byk 361 comprising is a polyacrylate copolymer;
- e) a silane treated cenosphere;
- 5 f) a fiberglass; and
- g) a Cab-O-Sil TS-720 comprising a hydrophobic fumed silica.

8. The insulating material as recited in claim 7, wherein said epoxy component mixture contains:

- a) at least about 12% by weight of the Epon 8132;
- b) at least about 12% by weight of the Epon 8161;
- c) at least about 4.5% by weight of the Heloxy 9;
- d) at least about 0.4% by weight of the Byk 361;
- e) at least about 19% by weight of the silane treated Cenospheres;
- 5 f) at least about 1.5% by weight of fiberglass; and
- g) at least about 0.4% by weight of Cab-O-Sil TS-720.

9. The insulating material as recited in claim 7, wherein said curing component mixture contains:

- 20 a) at least about 31% by weight of Epi-Cure 3164 comprising a polyamide curing agent for epoxy systems;
- b) at least about 2% by weight of Jeffamine D-230 comprising a polyether polyamine;

- c) at least about 0.4% by weight of Byk 361;
- d) at least about 2.5% by weight of Zirox 180;
- e) at least about 13% by weight of Cenospheres;
- f) at least about 1.7% by weight of fiberglass; and
- 5 g) at least about 0.4% by weight of Cab-O-Sil TS-720.

10. A method of installing an insulated tubular member on a sea floor comprising:

- providing a reel containing the tubular member;
- advancing the tubular member from the reel to a first heater member;
- heating the tubular member;
- straightening the tubular member in a hydraulic cylindrical press;
- monitoring the temperature of the tubular member;
- heating the tubular member in a second heater member to a predetermined
10 temperature;
- advancing the tubular member to a retort member;
- applying an insulation compound to the tubular member within said retort member,
said insulation compound comprising: a) an epoxy component mixture comprising an epoxy
compound, an acrylate monomer that is a precursor to an acrylic resin and a plurality of ceramic
particles; and b) a curing component mixture comprising curing agents and ceramic particles;
- 20 -curing said insulation compound about the tubular member;
- laying the insulated tubular member on the sea floor.

11. The method of claim 10 wherein the step of straightening includes:

- providing a first and a second laser;
- determining the tolerance of a section of the tubular member with the first laser and the second laser;
- 5 -adjusting a plurality of hydraulic rams located on said heater member in order to straighten the tubular member to a predetermined straightness as determined by the first and second laser.

12. The method of claim 11 wherein the retort member comprises a first halve mold pivotally connected to a second half mold and wherein the step of applying the insulation compound comprises:

- coating the mold halves with a permanent mold release agent for allowing the release of the tubular member;
- injecting the insulation compound into the mold halves under a pressure;
- 5 -allowing the insulation compound to cure;
- opening the mold halves;
- releasing the insulated tubular member from the mold halves.

13. The method of claim 12 wherein the step of applying the insulation compound
20 comprises:

- measuring a predetermined amount of epoxy component mixture and measuring a predetermined amount of curing component mixture; mixing said predetermined amount of epoxy

component mixture with said predetermined amount of curing component mixture; pumping the mixture into said retort.

14. The method of claim 13 wherein the first mold half and the second mold half contain a plurality of heating bands, and wherein the step of applying the insulation compound includes heating the first mold half and the second mold half when the epoxy component mixture and the curing component mixture is being injected into the mold halves.

15. The method of claim 10 wherein after the step of curing said insulation compound, the method further comprises:

- sensing when the insulation compound has cured;
- sending a signal to a control panel;
- withdrawing the tubular member from the retort;
- advancing a second section of the tubular member to the retort.

16. A system for applying an insulation compound to a tubular member, said tubular member being contained on a reel, the system comprising:

- a first heater means for heating the tubular member;
- a pipe straightener for straightening the tubular member;
- a retort means for containing a section of the tubular member and heating the section of the tubular member;
- a first vessel containing an epoxy compound, said first vessel being fluidly

connected to a pump means for pumping the epoxy compound to the retort means;

-a second vessel containing a curing agent compound, said second vessel being fluidly connected to said pump means;

-control means, operatively connected to the retort means, for injecting the epoxy compound and the curing agent compound into the retort means and generating a signal once a predetermined temperature level is reached;

-advancing means, operatively connected to the retort means, for advancing the tubular member from the retort means in response to the generated signal.

17. The system of claim 16 wherein the retort means comprises a first half mold and a second half mold pivotally hinged to said first half mold.

18. The system of claim 17 further comprising:

-laser means for determining the straightness of the tubular member, and producing a signal indicative of the straightness;

-second heater means, operatively associated with the laser means, for heating the tubular means in response to the laser means signal.

19. A method of glueing a first syntactic foam material with a second syntactic foam material with an insulation material, said insulation material (a) an epoxy component mixture comprising an epoxy compound, acrylic resins and ceramic particles; and (b) a curing component mixture comprising curing agents, and ceramic particles, said mixture being at a 1 to 1 volume

ratio;

5 -and wherein the epoxy component mixture contains: (a) an Epon 8132 comprising a diglycidal ether of bis-phenol-A mixed with a monofunctional epoxide of a C12-C13 aliphatic alcohol; (b) an Epon 8161 comprising a diglycidal ether of a bis-phenol-A mixed with acrylate monomers; (c) a Heloxy 9 comprising a monofunctional epoxide of a C12-C13 aliphatic alcohol; (d) a Byk 361 comprising a polyacrylate copolymer (e) a Cenospheres; (f) a fiberglass; and (g) a Cab-O-Sil TS-720 comprising a hydrophobic fumed silica;

10 -and wherein the curing component mixture contains: (a) an Epi-Cure 3164 comprising polyamide curing agent for epoxy systems; (b) a Jeffamine D-230 comprising a polyether polyamine; (c) a Byk 361; (d) a Zirox 180; (e) a Cenospheres; (f) a fiberglass; and (g) a Cab-O-Sil TS-720;

-and wherein the method comprising:

-applying said insulation material between said first syntactic foam material and said second syntactic foam material.